

# Use of Ecological Sites in Managing Wildlife and Livestock: An Example with Prairie Dogs

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## On the Ground

- The perception of prairie dogs among Native Americans living on the Standing Rock Sioux Reservation is mixed. Some Native Americans focus on the loss of forage productivity, whereas others are interested in the cultural and ecological aspects of prairie dogs.
- The use of ecological sites may provide a mechanism for developing a management framework that would consider both livestock and prairie dogs.
- The three ecological sites we surveyed had large differences in off-colony standing crop, but in 2 of the 3 years we surveyed, there were no differences between standing crop on-colony.
- This suggests that management of prairie dogs on rangelands should focus on limiting prairie dogs on more productive ecological sites with less productive sites receiving less emphasis.

**Keywords:** Ecological sites, wildlife-livestock interaction, species diversity, Standing Rock Sioux Reservation.

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The mixed-grass prairie of the Northern Great Plains (NGP) occupies most of North and South Dakota, large areas of Montana, Wyoming, and Nebraska<sup>1</sup> and extends north into Canada. The mixed grass prairie is also home to a native rodent, the black-tailed prairie dog (*Cynomys ludovicianus* Ord). On the Standing Rock Sioux Reservation, which straddles North and South Dakota, the perception of prairie dogs by Native Americans is complex. Some Native American livestock producers are concerned about potential livestock production

losses associated with prairie dog colonies on their rangelands. However, other Native Americans value prairie dogs for their role in cultural traditions, as a source of food, for medicinal value (James Garrett and Linda Black Elk, personal communications), and as a native component of prairie ecosystems. Livestock production is one of the primary land uses on many Native American reservations in the western United States, so reconciling the concerns of livestock producers with more traditional tribal members requires development of strategies that support the simultaneous maintenance of prairie dog colonies and livestock production.

A key in developing management strategies that benefit both prairie dogs and wildlife is to understand how the impacts of prairie dogs on the vegetative community and forage production may differ among ecological sites. Ecological sites are “a distinctive kind of land, based on recurring soil, landform, geological, and climate characteristics that differ from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and in its ability to respond similarly to management actions and natural disturbances.”<sup>2</sup> Each ecological site is unique in its ability to support different types of plant communities, and so different ecological sites have different production potentials. The responses of those plant communities to environmental factors, disturbance, and/or management provide the basis for developing state and transition diagrams for each ecological site. Rangelands in the NGP are a complex mosaic of ecological sites. The overall plant community within a pasture is made up of plant communities associated with the ecological sites, with each responding differently to prairie dog and livestock herbivory.

Many studies have compared vegetation on prairie dog towns to vegetation on nearby, off-town sites, but an evaluation of the role of soils and ecological sites is often lacking [see Gabrielson<sup>3</sup> for discussion]. A previous evaluation of how prairie dogs influenced soil properties on these same three ecological sites in South Dakota<sup>4</sup> indicated that prairie dogs contributed to considerable variation in soil properties but that soil properties within each ecological site responded

similarly to prairie dog disturbance. It is essential that any comparison of on-town and off-town vegetation be done on the same ecological sites; otherwise it is difficult to determine whether the differences can be attributed to prairie dogs or are a result of different edaphic conditions or other environmental factors. It is also important that intentional comparisons of plant communities and production on-town and off-town be conducted *between* ecological sites.

In this study, we asked the question: can we use ecological sites as a metric for use in managing prairie dogs? The objective of our study was to determine how the impact of prairie dogs on plant communities differed between ecological sites. Our null hypothesis was that the impact of prairie dogs would be similar across all ecological sites.

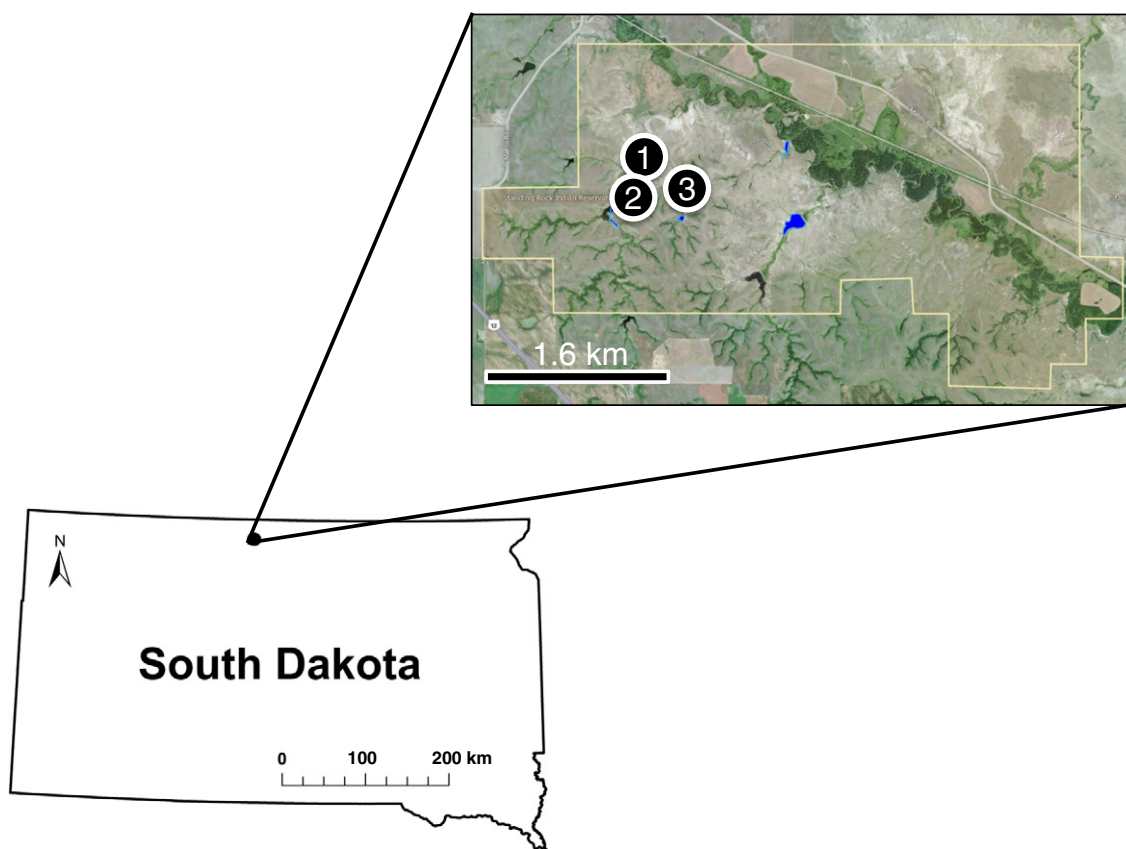
### Data Collection and Analysis

Our study site (45.74 N; 100.66 W) was located approximately 12.2 km southeast of McLaughlin, South Dakota, on a 1400-ha privately owned ranch that was a mix of private land and tribal lease land. Anecdotal information suggests that in the 1950s, prairie dog colonies on the ranch were restricted to two small 7-ha colonies in the toe-slope position. The prairie dog colonies began to expand in the 1980s and have since moved onto higher landscape positions

(Ricky McLaughlin, personal communication). At the time of the study, prairie dog colonies occupied approximately 800 ha.<sup>4</sup> Management of the ranch was fairly consistent from the 1940s until the early 2000s, with approximately 300 cows and 100 horses grazing throughout the season. By 2010, the majority of grazing was done by horses. In 2012, additional changes were made in the grazing regime to accommodate an USDA- Agriculture and Food Research Initiative grant. Also, prior to the 2012 grazing season, 25 grazing exclosures were distributed across the landscape.

We selected three ecological sites that represent a majority of the rangelands on the ranch: (1) a Thin Claypan, (2) a Loamy, and (3) a Shallow Loamy site. These sites also correspond to toe-slope, backslope, and summit landscape positions, respectively. Both prairie dog colonies and noncolonized areas are represented on all three ecological sites on the ranch (Fig. 1). For more information regarding soil properties and site descriptions, see Barth et al.<sup>4</sup>

Within each ecological site, four prairie dog mounds were randomly chosen in colonized areas, and four random points in uncolonized areas were selected. Around each mound or random point, two 0.125 m<sup>2</sup> quadrats were located 1 m from the center of the prairie dog hole, or from the designated point in noncolonized areas. The addition of exclosures in 2012 required the sampling sites to be moved slightly, but care was taken to stay on the same ecological sites with the same long-term grazing history. Quadrats were clipped by species to



**Figure 1.** Research ranch location in South Dakota and study site location on the research ranch. The sites are identified as (1) Thin Clay Ecological Site, (2) Shallow Loamy Ecological Site, and (3) Loamy Ecological Site.

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